

## L6 A Level Maths Assessment 2 Revision Questions

1.

Write down the value of  $p$  and  $q$  given that:

(i)  $9^p = 1$

(ii)  $\frac{1}{81} = 3^q$

[2 marks]

2.

Given that  $\frac{1}{\sqrt[4]{t^2}} = t^x$ , work out the value of  $x$

Circle your answer.

[1 mark]

$-2$        $-\frac{1}{2}$        $-8$        $-\frac{1}{4}$

3.

Given that  $(\sqrt{2})^3 \times (\sqrt[3]{2})^2 = 2^y$ , work out the value of  $y$

Circle your answer.

[1 mark]

$\frac{13}{6}$        $1$        $-\frac{11}{3}$        $\frac{5}{6}$

4.

Solve the equation

$$\frac{27^t}{3^{t-1}} = 3\sqrt{3}.$$

5.

The points  $A(0,3)$ ,  $B(2,-1)$  and  $C(k,1)$  are given, where  $k$  is a constant.

- a) Find the exact length of  $AB$ .
- b) Given that  $AB$  is perpendicular to  $BC$ , find the value of  $k$ .
- c) Determine the area of the triangle  $ABC$

6.

The straight line  $L_1$  passes through the points  $A(-6,4)$  and  $B(3,16)$ .

- a) Find an equation for  $L_1$ .

The straight line  $L_2$  passes through the points  $C(9,-1)$  and  $D(-7,11)$ .

- b) Find an equation for  $L_2$ .
- c) Show that  $L_1$  is perpendicular to  $L_2$

The point  $E$  is the of intersection of  $L_1$  and  $L_2$ .

- d) Show that the coordinates of  $E$  are  $(-3,8)$ .

7.

Find the centre and radius of the circle with equation  $x^2 + y^2 + 4x - 6y - 8 = 0$ .

**[3 marks]**

8.

A line has equation  $y = k$ , where  $k$  is a constant. For which values of  $k$  does the line not intersect the circle with equation  $x^2 + 3x + y^2 + 2y - \frac{3}{4} = 0$ .

**[4 marks]**

9.

The tangent to the circle  $(x + 4)^2 + (y - 1)^2 = 242$  at  $(7, -10)$  meets the  $y$ -axis at  $S$  and the  $x$ -axis at  $T$ .

**a** Find the coordinates of  $S$  and  $T$ . (5 marks)

**b** Hence, find the area of  $\triangle OST$ , where  $O$  is the origin. (3 marks)

10.

The line with equation  $y = kx$  intersects the circle with equation  $x^2 - 10x + y^2 - 12y + 57 = 0$  at two distinct points.

**a** Show that  $21k^2 - 60k + 32 < 0$ . (5 marks)

**b** Determine the range of possible values for  $k$ . Round your answer to 2 decimal places. (3 marks)

11.

A circle has its centre at the point  $C(-2, 3)$  and passes through the point  $P(-3, 8)$ .

**a** Find an equation for this circle.

**b** Show that an equation of the tangent to the circle at  $P$  is

$$x - 5y + 43 = 0.$$

12.

The curve  $C$  has equation

$$y = x^5 - 6x^3 - 3x + 25.$$

Find an equation of the tangent to  $C$  at the point where  $x = 2$ .

13.

The curve  $C$  has equation

$$y = \frac{6}{x^2} + \frac{5x}{4} - 4, \quad x \neq 0.$$

**a** Find an expression for  $\frac{dy}{dx}$ .

**b** Determine an equation of the normal to the curve at the point where  $x = 2$ .

14.

The curve  $C$  has equation

$$f(x) = 4x\sqrt{x} - \frac{25x^2}{16}, \quad x \geq 0.$$

- a) Find a simplified expression for  $f'(x)$ .
- b) Determine an equation of the tangent to  $C$  at the point where  $x = 4$ , giving the answer in the form  $ax + by = c$ , where  $a$ ,  $b$  and  $c$  are integers.

15.

The curve  $C$  has equation

$$f(x) = \frac{(2x-3)(x+2)}{\sqrt{x}}, \quad x > 0.$$

- a) Express  $f(x)$  in the form  $Ax^{\frac{3}{2}} + Bx^{\frac{1}{2}} + Cx^{-\frac{1}{2}}$ , where  $A$ ,  $B$  and  $C$  are constants to be found.
- b) Show that the tangent to  $C$  at the point where  $x = 1$  is parallel to the line with equation

$$2y = 13x + 2.$$

16.

Differentiate from first principles to find the derivative of each of the functions below.

(i)  $f(x) = 2x^2 - 3x + 1$

(ii)  $f(x) = x^3 - 2x^2 + 3$

17.

Use differentiation from first principles to show that the derivative of  $x^4$  is  $4x^3$ .

[4]

18.

Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  when  $y$  equals:

a  $12x^2 + 3x + 8$       b  $15x + 6 + \frac{3}{x}$       c  $9\sqrt{x} - \frac{3}{x^2}$       d  $(5x + 4)(3x - 2)$       e  $\frac{3x + 8}{x^2}$

